IN THE CLAIMS

While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

What is claimed is:

1. A magneto-resistive transducer including a stack of layers, said transducer comprising:

a first ferromagnetic layer having an end proximal to said disk surface;

a non-magnetic metal layer formed on said first ferromagnetic layer, said non-magnetic metal layer having an end proximal to said disk surface;

a second ferromagnetic layer formed on said non-magnetic metal layer, said second ferromagnetic layer having an end proximal to said disk surface;

an antiferromagnetic layer formed on said second ferromagnetic layer, said antiferromagnetic layer having an end proximal to said disk surface;

a layer of protective material applied to the proximal ends of the stacked layers;

said proximate end of said non-magnetic metal layer being recessed from said disk surface to form a recessed area; and

said recessed area being filled with protective material to a depth such that when said layer of protective material is worn from said proximal ends of said first and second ferromagnetic layers, and said anti-ferromagnetic layer, by burnishing by the disk surface, protective material still remains in said recessed area of said non-magnetic metal layer.

2. A magneto-resistive transducer as recited in claim 1, wherein:
said non-magnetic metal layer is copper.

3. A magneto-resistive transducer as recited in claim 1, wherein:
said protective material which is used to fill said recessed area is chosen from a group consisting of Diamond-Like Carbon, silicon, and silicon nitride.

4. A magneto-resistive transducer as recited in claim 1, wherein:
said layer of protective material and said protective material which is used to fill said recessed area is the same and is applied in the same coating process.

5. A magneto-resistive transducer as recited in claim 1, wherein:
said layer of protective material and said protective material which is used to fill said recessed area are applied separately in a two-stage process.

6. A magneto-resistive transducer as recited in claim 1, wherein:
said transducer is attached to electrical leads which supply current to said magneto-resistive transducer, said electrical leads having proximal portions proximal to said disk surface, wherein said proximal portions of said electrical leads are recessed to provide recessed areas; and
said recessed areas being filled with protective material to a depth such that when said layer of protective material is worn by burnishing by the disk surface, protective material still remains in said recessed areas of said electrical leads.

7. A slider for reading data from a disk surface, said slider including a magneto-resistive head, said head comprising:
a transducer having a stack of layers, each layer having a proximal end

proximal to said disk surface;

a plurality of electrical leads, connected to said transducer, each one of said plurality of electrical leads having a proximal end proximal to said disk surface;

at least one of said proximal ends of said electrical leads and said layers being recessed to provide at least one recessed area; and

said at least one recessed area being filled with protective material to a depth such that when said layer of protective material is worn from said proximal ends by burnishing by the disk surface, protective material still remains in said recessed area.

8. A slider as recited in claim 7, wherein:

said at least one of said proximal ends which is recessed from said disk surface is a non-magnetic metal layer.

9. A slider as recited in claim 7, wherein:

said at least one of said proximal ends which is recessed from said disk surface is at least one of said plurality of electrical leads.

10. A slider as recited in claim 7, wherein:

said at least one of said proximal ends which is recessed from said disk surface is recessed by a process chosen from the group consisting of wet etching, dry etching, reactive ion etching, and reactive ion beam etching.

11. A slider as recited in claim 7, wherein:

said layer of protective material and said protective material which is used to fill said recessed area is the same and is applied in the same process.

12. A slider as recited in claim 7, wherein:

said layer of protective material and said protective material which is used to fill said recessed area are applied separately in a two-step process.

13. A slider as recited in claim 7, wherein:

said slider includes a write head.

14. A method of fabrication of a slider for reading data from a disk surface, said slider having a magneto-resistive transducer including a stack of layers, and electrical leads attached to said transducer, said electrical leads having a proximal end which is proximal to said disk surface, comprising the steps of:

A) forming a first ferromagnetic layer having an end which will be proximal to said disk surface;

B) forming a non-magnetic metal layer on said first ferromagnetic layer, said non-magnetic metal layer having an end which will be proximal to said disk surface;

C) forming a second ferromagnetic layer on said non-magnetic metal layer, second ferromagnetic layer having an end which will be proximal to said disk surface;

D) forming an antiferromagnetic layer on said second ferromagnetic layer, said antiferromagnetic layer having an end which will be proximal to said disk surface;

E) recessing at least one of said proximal ends of said non-magnetic metal layer and said electrical leads from said disk surface to form at least one recessed area; and

F) filling said at least one recessed area with protective material.

15. The method of fabrication as recited in claim 14, further comprising:

G) applying a layer of protective material to said proximal ends of the stacked layers and said electrical leads.

16. The method of fabrication as recited in claim 14, wherein:

said recessing step E is performed by an operation chosen from the group consisting of wet etching, dry etching, reactive ion etching, and reactive ion beam etching.

17. The method of fabrication as recited in claim 14, wherein:

said filling step F is performed by an operation chosen from the group consisting of ion beam deposit (IBD), chemical vapor deposition (CVD), physical vapor deposition (PVD) and sputtering deposition.

18. The method of fabrication as recited in claim 14, wherein:

said at least one of said proximal ends which is recessed from said disk surface is said non-magnetic metal layer.

19. The method of fabrication as recited in claim 14, wherein:

said at least one of said proximal ends which is recessed from said disk surface is at least one of said plurality of electrical leads.

20. The method of fabrication as recited in claim 14, wherein:

said protective material which is used to fill said recessed area is chosen from a group consisting of Diamond-Like Carbon, silicon and silicon nitride.

21. The method of fabrication as recited in claim 15, wherein:

said layer of protective material and said protective material which is used to fill said recessed area is the same, and filling step F and said applying step G are performed in the same process.

22. A computer disk drive having a slider for reading data from a disk surface, said slider including a magneto-resistive head, said head comprising:

a transducer having a stack of layers, each layer having a proximal end proximal to said disk surface;

a plurality of electrical leads, connected to said transducer, each one of said plurality of electrical leads having a proximal end proximal to said disk surface;

at least one of said proximal ends of said electrical leads and said layers being recessed to provide at least one recessed area; and

said at least one recessed area being filled with protective material to a depth such that when said layer of protective material is worn from said proximal ends by burnishing by the disk surface to a depth which is typical of drive burnishing, protective material still remains in said recessed area.